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**PERFORMANCE OF
WASTE PAPER RECOVERY SYSTEM
AT
ST. JOSEPH PRINTING**

APRIL 1993



**Ministry of
Environment
and Energy**

ISBN 0-7778-0254-6

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PIBS 2270

**PERFORMANCE OF WASTE PAPER
RECOVERY SYSTEM AT ST.JOSEPH PRINTING**

Report prepared by:

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in affiliation with

Waste Management Branch
Ontario Ministry of Environment and Energy

ACKNOWLEDGEMENTS

St. Joseph Printing Limited would like to acknowledge the aid and support of the Ontario Ministry of the Environment in the funding which allowed this project to proceed.

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1) EXECUTIVE SUMMARY

The waste paper handling and recovery system installed at St. Joseph, has proven to be both effective and economic. The capability of the system to: 1) separate and convey trim waste from the bindery process to remote storage hoppers, 2) to allow separation of waste into grades of recyclable paper, 3) to automatically bale paper ready for shipment and 4) the addition of a dedicated shredder to the waste stream process; has allowed all process waste paper to be recycled. Further, by allowing selective separation of grades of waste paper, the resulting bales of waste paper can be sold at maximum price to recyclers and can thus be used in optimum grades of recycled paper. The shredder allows all no-trim waste, such as press-breaks, test runs, non-acceptable printed products, etc. to be shredded and baled, thus allowing treatment of this stream of waste in the same manner as trim waste. All these various features result in:

- 1) Handling of an extremely large waste paper stream.
- 2) Returning 1,800 tons per annum of clean and uncontaminated waste paper to the most efficient level of the recycling stream, thus allowing for previously unknown efficiencies to be realized and at the same time reducing potential landfill requirements.
- 3) Maximizing cash return for waste paper which would normally cost the company for disposal rather than return a dividend both to the bottom line and the environment, (additional \$122,000 in waste paper revenue June 1991-May 1992).
- 4) Save space heating and cooling energy, because the system is capable of being installed indoors, unlike competing systems.

The waste paper system, as installed at St. Joseph has made the company economically more competitive and at the same time has reduced non-recyclable waste paper, and thus diverted waste from landfill.

2. INTRODUCTION - St. Joseph Printing Limited

St Joseph Printing is a family owned corporation which began its history 37 years ago when the founder began printing wedding invitations in his basement. Seven years ago, the company's volume was about 4 million dollars but began to expand dramatically, outgrowing its existing 60 000 s.f. building.

In August 1989 St. Joseph began the design leading to construction of a new facility in Concord Ontario. St. Joseph had bought 10 acres in the Hwy 7, Jane area, and after many planning sessions a layout for this site was decided upon, and included 220 000 s.f. of plant and office space, sufficient to house 3 sheet-fed presses and five web presses.

To service these presses and other plant functions certain support facilities were required to be designed. Energy efficiency and conservation were made top design and construction priorities by the St. Joseph Board of Directors. While this report deals primarily with the waste paper system, other process systems in the plant were equally as efficient and effective. These included a chilling system which uses for the bulk of its chilling capacity a free energy source; outside air; an owner operated hydro substation using the latest power factor correction equipment, reducing hydro demand charges; and numerous other energy saving features, such as low-E glass, metal halide and high-pressure sodium lights, high efficiency motors throughout, spot cooling systems, and water cooled compressed air systems. After construction it was calculated by Ontario Hydro that these plant efficiencies save enough electricity in one year to operate about 350 average size homes.

3) THE PROBLEM - WASTE PAPER HANDLING & RECYCLING

In the print industry a substantial amount of paper is wasted. Depending on the efficiency of a specific company, this wasted paper can be between 5% and 15% of total paper consumed.

One stream of waste paper is composed of large sheets or lengths of paper. Some of this waste is a result of initial machine set-ups, threading rolls of paper through the machine rollers in preparation to start of printing. Some waste is a product of web breaks on the machines resulting in torn and ruined paper. Some of the waste results from unacceptable print quality and discarding of this faulty product or from trial runs prior to client acceptance.

Another stream of waste paper results from the bindery process. Here wide printed paper is cut and trimmed in preparation for folding and binding.

At St. Joseph's old facility, the trim waste from the bindery was baled and would have been sold to paper dealers for recycling. Various grades of paper exist including groundwood and freesheet, and these two types can be coated or uncoated and further these combinations can be covered with ink printing or be ink-free. Each combination had a different use. Because of the mixture of various grades of paper due to lack of separation facilities, this waste was the least desirable. Further, the waste paper from trial runs breaks etc., was a nuisance to paper recyclers because many did not have shredding facilities to process this waste prior to recycling use. Also handling bulk waste paper was uneconomic if the paper was not baled as well as shredded.

The lack of adequate sorting, shredding and baling facilities resulted in large volumes of undesirable or unrecyclable waste paper products. Ultimately this meant that large volumes of waste paper would end up in landfills and further, St. Joseph would forfeit any potential revenue from properly sorted and completely recycled waste paper.

In November 1990, St. Joseph Printing Limited applied to the Ministry of Environment for assistance in improving its waste paper collection facilities so that waste paper recycling could be maximized.

4) PROJECT EQUIPMENT

During the summer and fall of 1990, St. Joseph Printing researched various waste paper handling systems available. After due consideration it was decided that St. Joseph would utilize the system proposed by Kernic Equipment Sales. The main features of Kernic's proposal included the following items:

- a) Kernic's Blue Box's would be used to receive all dust, paper and waste from the bindery and the shredder. The added advantage of Kernic's Blue Box is that the waste paper conveying and storage is kept within the building rather than in a cyclone-type vacuum system, which, because of its greater dust generation, would have to be installed outside the building. Because the vacuum conveying system uses about 12000 cubic feet per minute, the indoor placement of the system saves in conditioning the conveying air. In the cyclone, this air would be dumped outside resulting in additional plant heating requirements in winter and cooling in summer. The Kernic system filters and recirculated the same air back into the plant.
- b) An automatic baler (Maren Model 203-103 heavy duty open end automatic cycling baler) complete with an automatic bale tier was part of the system. This auto feature allows a bale of shredded paper to be formed and tied, much like a bale of hay, from waste paper deposited in the blue box. No attendant needs to be present.
- c) The shredder (Gruendler Model 48-HRS) proposed with the system, utilizes a cart-dumping feature, allowing large sheets to be collected in carts and mechanically unloaded into the shredder. The capacity of this shredder is 4-7000 lbs/hr.
- d) Because of the distance from where the waste paper is generated to the baler room, a concentrator was needed to act as a transfer station. The equipment arrangement allows the separation of paper into two grades from the bindery equipment. Trim waste is conveyed separately from each piece of bindery equipment to a custom designed Concentrator. The Concentrator has a split housing for two grades. An automatic diverter is located in each incoming duct line that will divert the trim to the respective side. This is controlled by a remote station at the bindery equipment.
- e) Two parallel main duct lines run from the Concentrator to the baler room. Two separate Blue Boxes and auto-tie balers bale two grades of waste paper. The shredding system has the option to convey waste to either box depending on the grade. Shredding and trim can operate simultaneously. In the event a baler malfunctions, all trim will automatically go to one side. Shredding will stop during this period.

The Baler room layout is shown on Figure 1.

5) PROJECT COST

<u>EXPENSES</u>	<u>COST</u>
Waste Paper Handling System- baler, cart dumper, shredder	\$475,000
Related Duct Collection System	\$10,836
Upgrade on existing baler	\$10,000
10 In-plant Containers	\$5,400
Air & Water to Baler System	\$15,241
Supply and Install Electrical Interconnection for Balers	\$39,900
Construction Management	\$20,000
<u>Totals:</u>	<u>\$576,377</u>
Ministry of Environment Contribution	\$144,094

6) INSTALLATION AND COMMISSIONING

St. Josephs specified that the system be capable of collecting separate grades of trim waste. Because of the location of various trim waste stations and the distances between the bindery and the baler room, an engineering design was required to balance all air requirements. Installation began and was partially completed by the middle of February, in time for the running of St. Josephs new Mitsubishi Press. The balance of the system was completed over the next two months, coinciding with the relocation of one Blue Box from St. Josephs old facility. No unexpected problems occurred during installation and commissioning and the system performed as anticipated.

7) RESULTS

The targeted goal in implementing this system was twofold. Firstly, to return the waste paper back into the recycling stream at it's cleanest and least contaminated stage. Secondly, to efficiently and economically manage St. Joseph's internal flow of waste paper, again yielding the highest financial return.

The two graphs (Graph 1 & 2) illustrate the transition from March 91 to March 92. In March 91, separated waste represented only 13% of our total waste. This 13% waste was made up of the three poorest grades of paper (B-10,11,12 - see paper grades, Figure 7). Conversely, one year later, the landscape has changed dramatically. What used to represent a mere 13%, now accounts for 80%. Moreover, of that 80% the grades being separated range from #1 right through to #12.

St. Joseph Printing generates on average 18-24,000 lbs. of waste paper daily. As a result of installation of the Kernic Sytem, a net change of 67% (80%-13%) or between 12,000 lbs. and 16,000 lbs. per day of waste paper is now shredded sorted and baled, producing a dollar return and reducing land fill requirements. At an average rate of 21,000 lbs. of waste paper per day this amounts to landfill diversion of 14,000 lbs. per day or (14,000 lbs. X 52 weeks X 6 working days) or about 4.4 million lbs. per annum.

Graph 3, "Total waste paper generated," shows a steady growth of waste paper, paralleling company volume growth. As this volume increases with growth so does the diversion of paper from landfill, thus greater the success of the waste diversion program. As a bonus, graph 4, "Waste paper refunds" indicates that the better sorting and grading capabilities of the system produced about \$122,000.00 in additional revenue for recyclable paper.

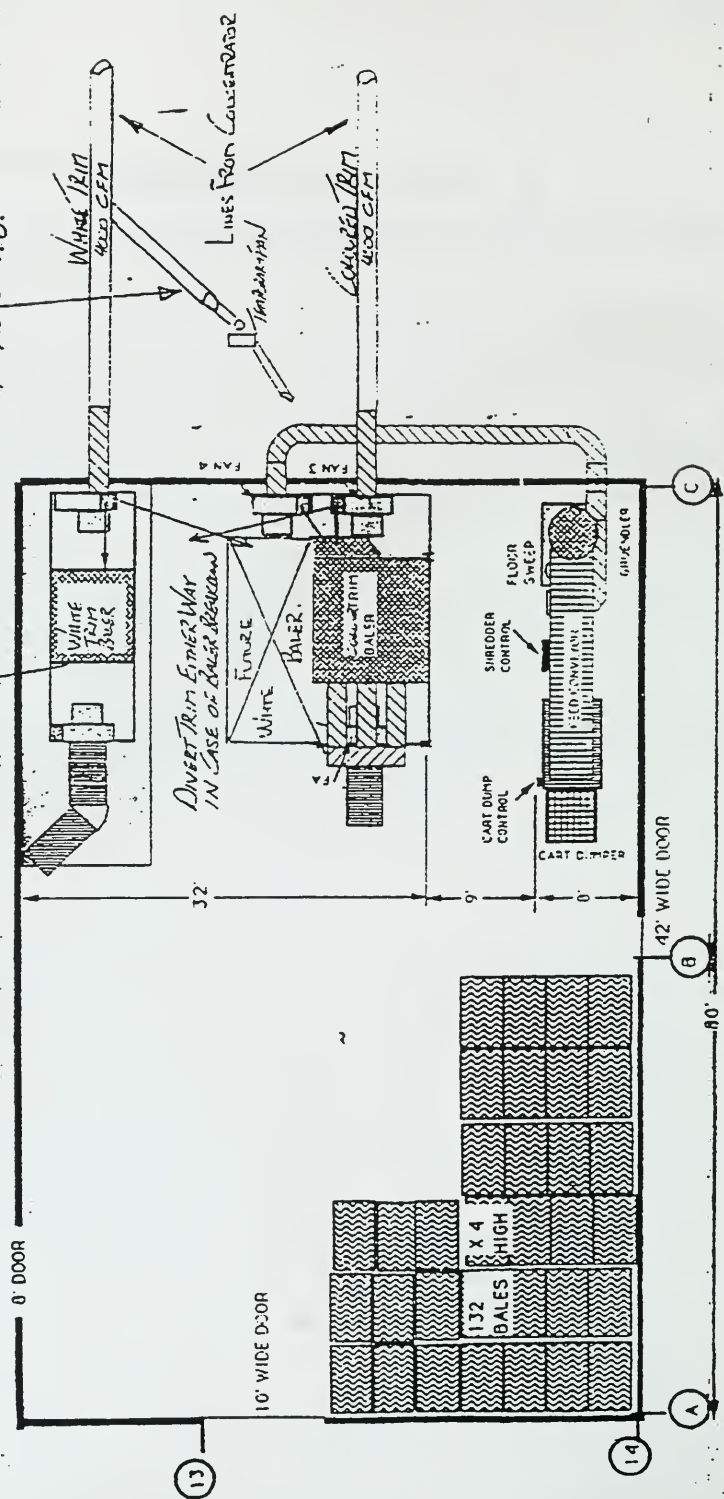
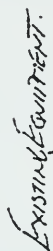
In the period June 90 - May 92, a total of 1850 additional tonnes of waste paper was sorted and baled as a result of installing the Kernic system. At the time St. Joseph's started planning the new facility, waste paper removal was a net cost to the company. Most of the paper removal contractors charged for their services or at least only paid a nominal amount for waste paper. In the intervening years, as more mills become capable of using recycled stock, so the market price for this waste product becomes more firm. As competition from buyers increases, waste paper handling has become a net profit operation. St. Joseph is able to sell virtually all of its waste paper to recycling dealers. During the period in question the main buyer of the paper was Mississauga Paper Fibres Ltd. To take advantage of competition St. Joseph does not contract to sell all its paper to one buyer on a long term basis, but takes advantage of competitive prevailing rates. Prices of course vary depending on the demand.

8) CONCLUSIONS AND RECOMMENDATIONS

- 1) The waste paper handling system has been in operation for over one year. During this time it has operated efficiently and reliably with minor downtime.
- 2) By returning more waste paper at its cleanest and least contaminated grade, the company has increased its savings relative to waste paper: Less cost for landfill and greater return for recycled paper, both in volume and in grade. As well the Kernic Blue Box system is clean enough to allow indoor installation, thus eliminating exhaust of heated (or cooled air) outside of the building. Thus building climate control costs are not effected by the waste paper handling system. Other waste paper handling systems use an outdoor cyclone method of gathering paper, thus dumping building heat outside.
- 3) In its first full year of operation the Kernic system has allowed St. Joseph to upgrade approximately 1,800 tons of waste paper by shredding , sorting and bailing, and in the process, St. Joseph has increased its revenue from waste paper for recycling sales by \$122,000.00.
- 4) Because of the effectiveness, reliability and cost savings inherant in the Kernic waste paper handling system, it is St. Joseph's recommendation that this system has worked as well and better than the company's expectations.

**WASTE PAPER HANDLING
SYSTEM LAYOUT**

ATTENDARY, BUT THE TOLUCA
UNIT UNTIL FURTHER ADVISEMENT
IS RELOCATED.



13

19



90.



St. Joseph Printing Limited

EFFECTIVE AS OF FEBRUARY 01/92

RATES PER TON

BALED LOOSE

\$ _____ \$ _____

\$ _____ \$ _____

\$ _____ \$ _____

\$ _____ \$ _____

\$ _____ \$ _____

\$ _____ \$ _____

\$ _____ \$ _____

\$ _____ \$ _____

\$ _____ \$ _____

\$ _____ \$ _____

\$ _____ \$ _____

\$ _____ \$ _____

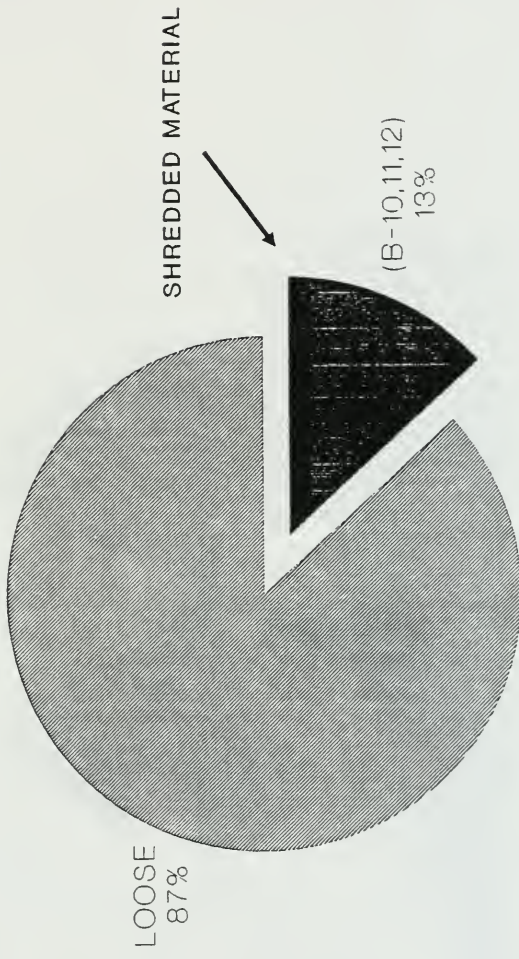
GRADES OF WASTE PAPER

- | | | |
|-----|---|-----------------|
| 1. | Uncoated Freesheet
No Ink Coverage | "Hard White" |
| 2. | Coated Freesheet
No Ink Coverage | "Soft White" |
| 3. | Uncoated Groundwood
No Ink Coverage | "News Blank" |
| 4. | Uncoated Freesheet
Low Ink Coverage (Trim) | "White Ledger" |
| 5. | Uncoated Freesheet
High Ink Coverage (Signatures) | "Colour Ledger" |
| 6. | Uncoated Groundwood
Low Ink Coverage (Trim) | |
| 7. | Coated Groundwood
No Ink Coverage | "Pub Blank" |
| 8. | Coated Freesheet
Low Ink Coverage (Trim) | |
| 9. | Coated Freesheet
High Ink Coverage (Signatures) | |
| 10. | Coated Groundwood
Low Ink Coverage (Trim) | |
| 11. | Coated Groundwood
High Ink Coverage (Signatures) | |
| 12. | Uncoated Groundwood
High Ink Coverage (Signatures) | |

**COMPARISON OF WASTE PAPER
VOLUMES AND REFUNDS**

WASTE PAPER GENERATED

TOTAL 435,258 LBS

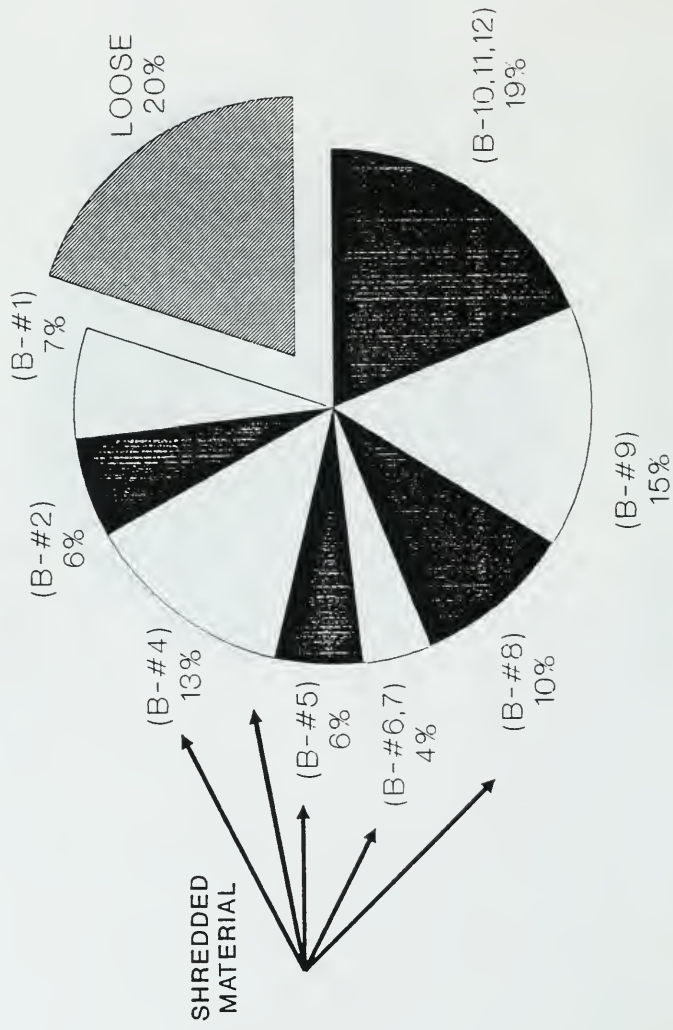


ST. JOSEPH PRINTING
FOR THE MONTH OF MARCH 1991

GRAPH #1

WASTE PAPER GENERATED

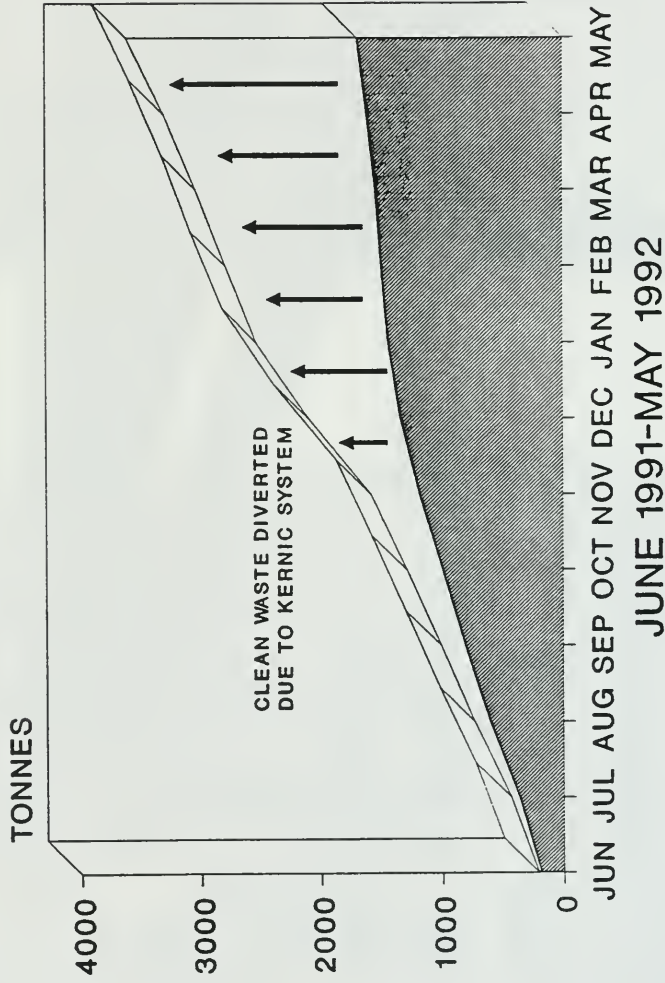
TOTAL 488,842 LBS



ST. JOSEPH PRINTING
FOR THE MONTH OF MARCH 1992

GRAPH #2

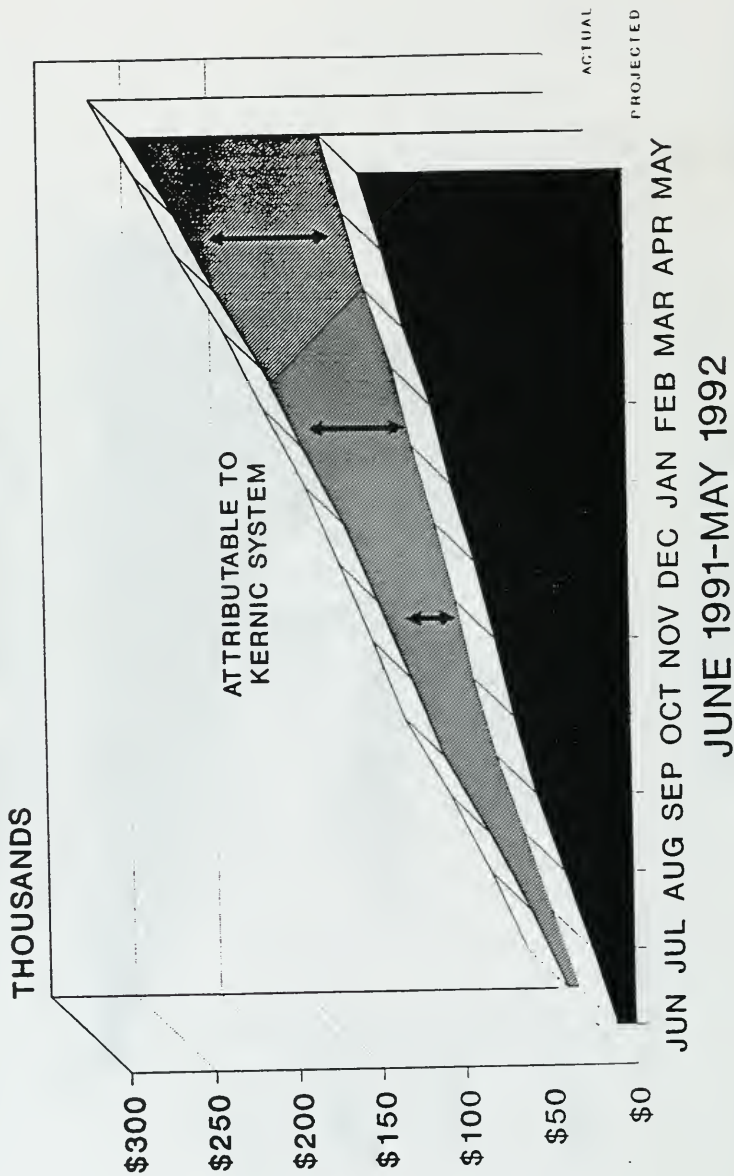
TOTAL WASTE PAPER GENERATED



ST. JOSEPH PRINTING
MAY 1992

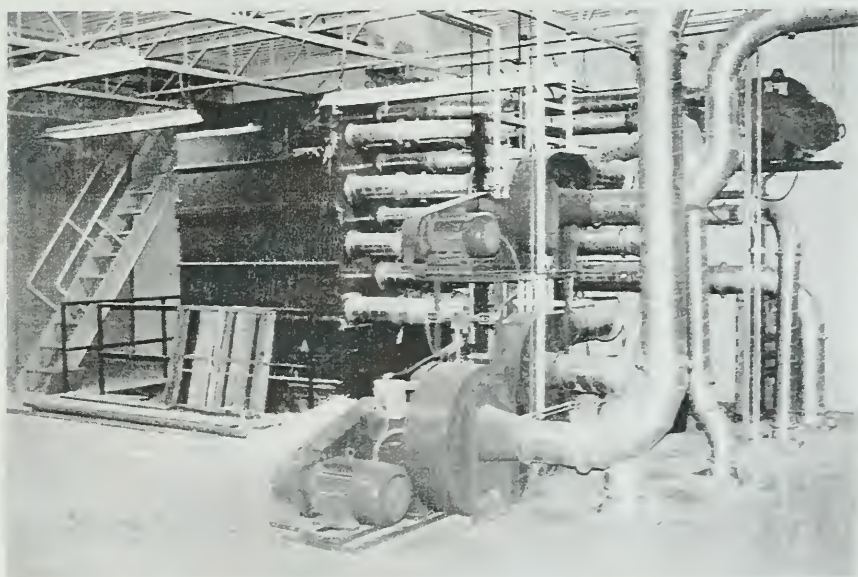
GRAPH #3

WASTE PAPER REFUNDS

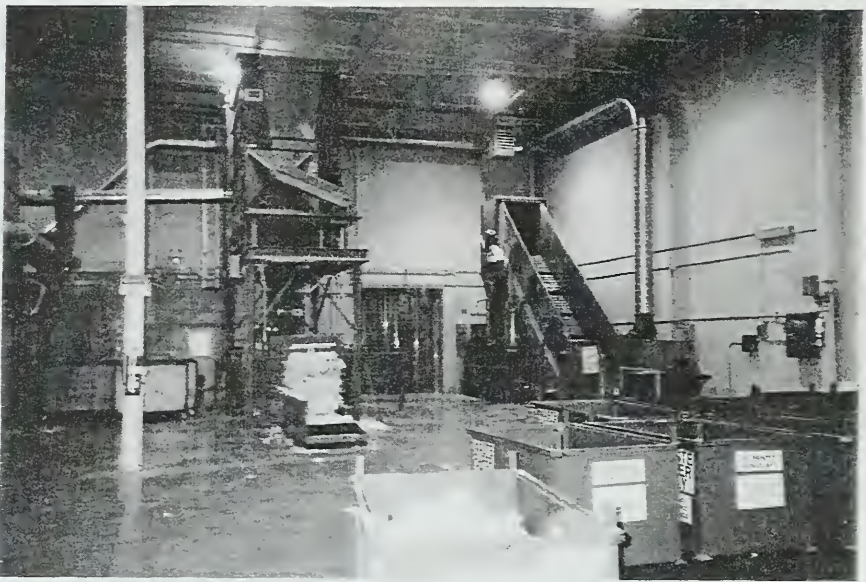




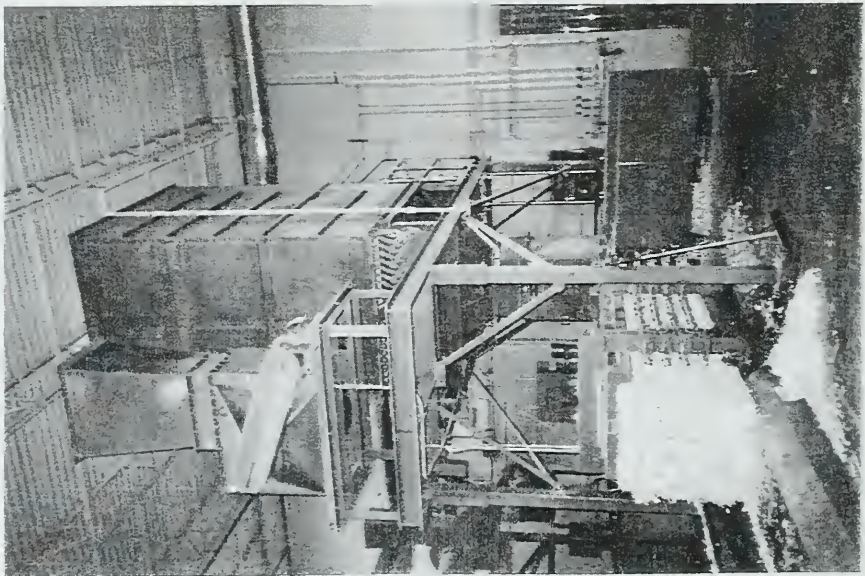
Kernic System Waste Trim Collection Ducts



Concentrator



View of Baler Room Including Shredder



Blue Box and Baler



Shredder With Cart-Dump



Truck Loaded with Baled Waste Paper

